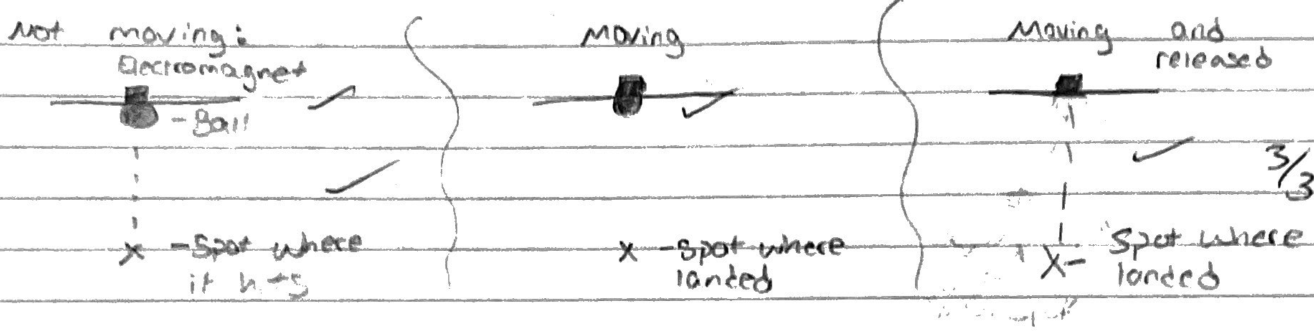
Ch. 4 Conceptual Questions ; 9,13
Ch. 4 Problems ; 13,15,51,56
Supp Ex ; 18,20

$\frac{15}{15}$

Taylor Larrechea

Conceptual Questions

9 The ball is going to land on the same spot where it landed when the plane was sitting still. The reason why this is is because the x-y components are individual of one another and they act independently from one another. The plane is also moving at a constant speed and that factors into where it will land as well.



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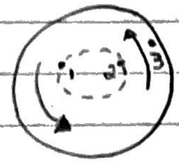
13



Largest to Smallest Angular velocity

Largest	Mid	Smallest
ω_1, ω_2		ω_3

The inner most points (ω_1, ω_2) have a smaller radius and a shorter period than ω_3. Thus giving them a lager angular velocity.

Largest to Smallest Speeds

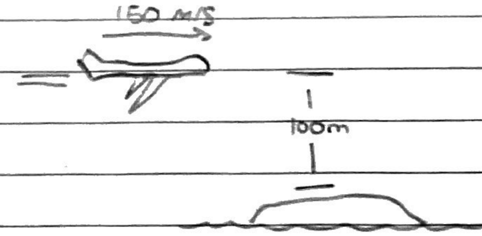
Largest	Smallest
V_1, V_2	V_3

The inner most points on the wheel have a smaller circumfrence to travel to complete one revolution. Since speed is distance/time, and V_1 and V_2's distance is smaller than V_3's, V_1 and V_2 have a greater speed.

$v_{1x} = v_{0x} + a_x \Delta t$

$x_1 = x_0 + v_{0x} \Delta t + \frac{1}{2} a_x (\Delta t)^2$

$v_{1x}^2 = v_{0x}^2 + 2 a_x \Delta t$



Ch 4. Problems

13

$t_0 = 0\,s$	$t_1 = 4.5\,s$
$v_{0x} = 150\,m/s$	$v_{1x} = 150\,m/s$
$v_{0y} = 0\,m/s$	$v_{1y} = 0\,m/s$
$x_0 = 0\,m$	$x_1 = 675\,m$
$y_0 = 100\,m$	$y_1 =$
$a_{x_0} = 0\,m/s^2$	$a_{x_1} = 0\,m/s^2$
$a_y = -9.8\,m/s^2$	$a_y = -9.8\,m/s^2$

$0 = 100m + \frac{1}{2}(-9.8\,m/s^2)\Delta t^2$

$-100 = -4.9\,m/s^2 \Delta t$

$\Delta t^2 = 20.4$

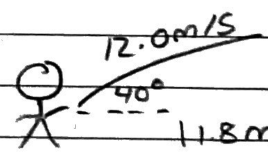
$\Delta t = 4.5$

The package needs to be dropped 675 m, before the island.

$X_1 = 0m + 150\,m/s\,\Delta t + 0$

$X_1 = 150\,\Delta t$

15



$t_0 = 0\,s$	$t_1 = 1.8\,s$
$v_{0x} = 9.2\,m/s$	$v_{1x} = 9.2\,m/s$
$v_{0y} = 7.7\,m/s$	$v_{1y} =$
$x_0 = 0\,m$	$x_1 = 13.86\,m$
$y_0 = 1.8\,m$	$y_1 = 0\,m$
$a_{x_0} = 0$	$a_{x_1} = 0\,m/s^2$
$a_{y_0} = -9.8\,m/s^2$	$a_{y_1} = -9.8\,m/s^2$

$VX = 12\cos 40$

$Vy = 12 \sin 40$

$0 = 1.8m + 7.7\,m/s\,\Delta t - 4.9(\Delta t)^2$

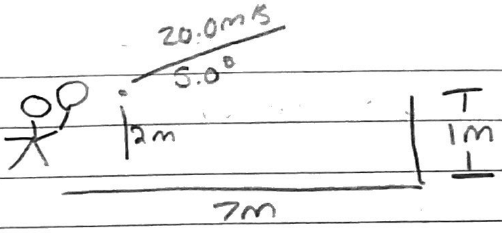
$0 = -4.9\Delta t^2 + 7.7\,m/s\,\Delta t + 1.8m$

$X_1 = 0m + 7.7(1.8)$

$X_1 = 13.86$

The Shot travels 13.86 m

$V_1x = V_0x + a_x \Delta t$
$x_1 = x_0 + V_0x \Delta t + \frac{1}{2} a_x (\Delta t)^2$
$V_1x^2 = V_0x^2 + 2a_x \Delta t$



51 $t_0 = 0\,s$ — $t_1 = 0.35\,s$
$x_0 = 0\,m$ — $x_1 = 7m$
$y_0 = 2\,m$ — $y_1 = 1.9\,m$
$V_{0x} = 19.9\,m/s$ — $V_{1x} = 19.9\,m/s$
$V_{0y} = 1.7\,m/s$ — $V_{1y} =$
$a_y = -9.8\,m/s^2$ — $a_y = -9.8\,m/s^2$

x-comp = 20cos5
y-comp = 20 sin 5

$7m = 0m + 19.9\,\Delta t$
$\Delta t = \frac{7m}{19.9m}$

$y_1 = 2m + 1.7(0.35) - 4.9(0.35)^2$
$y_1 = 2m + 0.595m - 0.6m$
$y_1 = 1.995$

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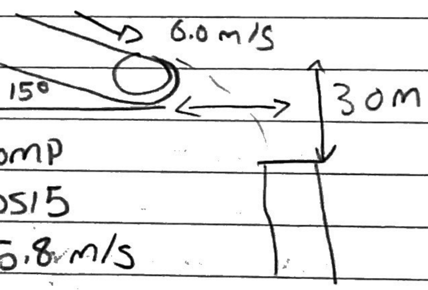
The ball will clear the net by 0.9 m



56 $t_0 = 0s$ — $t_1 = 0.9\,s$
$x_0 = 0m$ — $x_1 = 5.22m$
$y_0 = 3.0m$ — $y_1 = 0m$
$V_{0x} = 5.8\,m/s$ — $V_1x = 5.8\,m/s$
$V_{0y} = 1.6\,m/s$ — $V_1y = 0\,m/s$
$a_y = -9.8\,m/s^2$ — $a_y = -9.8\,m/s^2$

x-comp
6cos15
x=5.8 m/s
y-comp
6sin15
y=1.6 m/s

$0 = 3.0m + 1.6\Delta t - 4.9\Delta t^2$
$\Delta t = 0.96$
$x_1 = 0m + 5.8(0.9)$
$x_1 = 0m + 5.22m$
$x_1 = 5.22m$

The horizontal distance is 5.22 m.

Supplementary Exercises

18

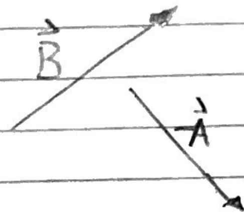
A)

Before = $\vec{B}$

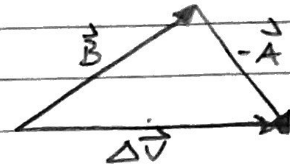
After = $\vec{A}$

$\Delta\vec{v} = -\vec{A} + \vec{B}$

$\Delta\vec{v} = \vec{B} + (-\vec{A})$

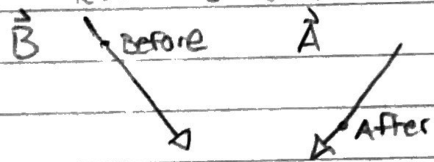


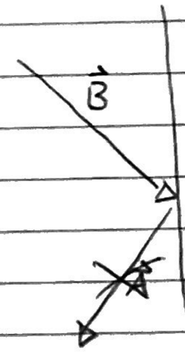
$\Delta\vec{v} = \vec{B} + (-\vec{A})$



$\Delta\vec{v} = \vec{B} + (-\vec{A})$

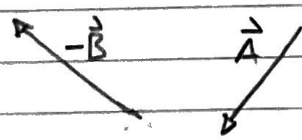
B.) Reversed direction



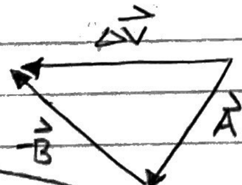


$\Delta\vec{v} = \vec{A} - \vec{B}$

$\Delta\vec{v} = \vec{A} + (-\vec{B})$



$\Delta\vec{v} = \vec{A} + (-\vec{B})$

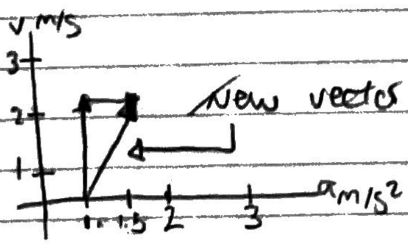


Part A : $\Delta\vec{v} =$ →

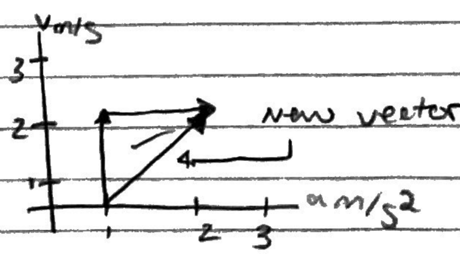
Part B : $\Delta\vec{v} =$ ← or

The two vectors are negatives of each other. Opposite directions

20 a.)



b.)



c.) Case ~~ii~~ iv would be the correct choice because because i and ii have constant x velocities, And since we are given an acceleration, the velocity changes throughout. Since case (iv)'s x-velocity die out and ~~doesn't~~ remain constant, case (iii).